

# Self-study tutorial for energy storage engineers





## Overview

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This online learning experience provides you with interactive content, videos, readings, a downloadable learning guide, non-graded practice questions and a graded final assessment to test your understanding of the material covered in this course. What should be included in an economic analysis of energy storage systems?

An economic analysis of energy storage systems should clearly articulate what major components are included in the scope of cost. The schematic below shows the major components of an energy storage system. System components consist of batteries, power conversion system, transformer, switchgear, and monitoring and control.

What are the components of energy storage systems?

System components consist of batteries, power conversion system, transformer, switchgear, and monitoring and control. A proper economic analysis identifies the costs associated with each of these components. Source: EPRI. Understanding the components of energy storage systems is a critical first step to understanding energy storage economics.

What are energy storage specific project requirements?

Project Specific Requirements: Elements for developing energy storage specific project requirements include ownership of the storage asset, energy storage system (ESS) performance, communication and control system requirements, site requirements and availability, local constraints, and safety requirements.

What is the operational life of an energy storage system?

The operational life of an energy storage system is a tricky concept to define generally, but it typically refers to how long a system is able to operate before degradation prevents the system from safely and reliably performing its objectives.



Which energy storage technology is best suited?

Some energy storage technologies, like super-capacitors, are best at responding quickly and come in small modular form factors making them ideal for fast, "power" services like frequency response. Other technologies like pumped hydro are only feasible on a large scale, so are best suited for high "energy" services like energy time shifting.

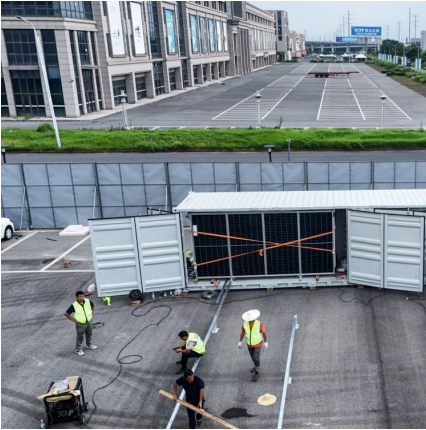
What is fast acting energy storage?

Fast acting energy storage systems may perform dynamic grid services (like frequency regulation) better than conventional alternatives. Due to their inherently low inertia, some inverter based energy storage technologies are able to react quickly to control commands.



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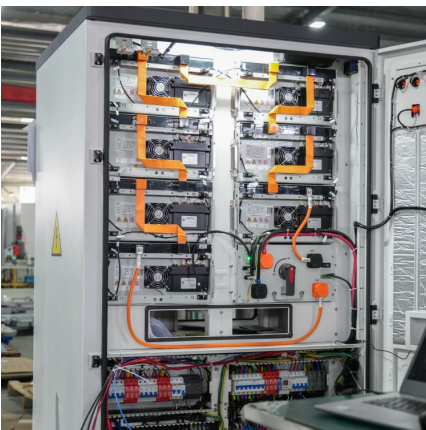
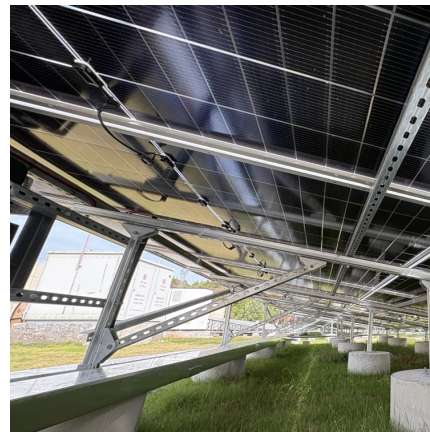


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Background This slide deck was developed for and presented at an Energy Fundamentals Course hosted by the Bangladesh University of Engineering and Technology (BUET) in October 2022. ...



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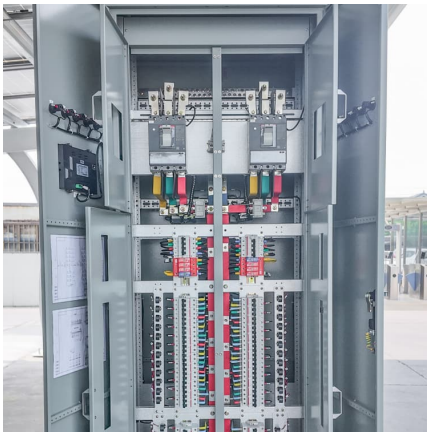


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